claim the subject matter which applicant regards as the invention. The Examiner's position is stated as follows:

> Regarding claims 2 and 12, what is meant by "a traveling wave antenna supporting a phase velocity greater than the speed of light"?

This rejection is respectfully traversed.

First, traveling wave antennas in general are notoriously old. See, for example, the following US Patents: R. A. Marino, No. 6,043,785; Y. Guo et al., No. 6,239,761; and M. W. Schnetzer, No. 5,519,408.

Second, the phrase *supporting a phase velocity greater than the speed of light* simply means that the antenna is designed to so that an electromagnetic wave propagates under the condition that its phase velocity is greater than the speed of light. In this regard, it is instructive to recall that the *phase velocity* of a wave is the rate of change of its phase with time. The phase velocity of a *fast wave* is greater than the speed of light, whereas the phase velocity of a *slow wave* is less than the speed of light. See, for example, J. D. Kraus, *Antennas*, 2nd Edition, McGraw Hill, Inc., New York (1988), pp. 760-762. A TEM wave is an example of a slow wave; its phase velocity is less than the speed of light. In contrast, the *group velocity* (or signaling velocity) of an electromagnetic wave never exceeds the speed of light.

It is, therefore, respectfully submitted that claims 2 and 12 utilize terminology that is well known in the art, are not indefinite, and satisfy the requirements of Section 112.

Claim Rejections – 35 USC 102

In paragraphs 4-5 of the Office action, Claims 1, 3-9, 11, 13-18 have been rejected under 35 USC 102(e) as being anticipated by M. C. Wicks et al., US Statutory Invention Registration, Reg. No. H2016H, published on April 2, 2002 and filed on March 5, 1986 (hereinafter *Wicks*).

This rejection is respectfully traversed.

Regarding Claim 1, the Examiner's position is as follows:

> Wicks et al. teaches in figures 1-5 an antenna structure comprising: at least one antenna element [mono-blade antenna element], that at least one antenna element having at least one taper (See Figure 4); and a symmetrical ground plane [ground plane] coupled with the at least one antenna element [mono-blade antenna element].

At first blush it would appear that the Examiner's application of Wicks to Claim 1 might be correct. But such a reading of Wicks would be superficial at best. Upon a more careful reading it is clear that Wicks fails to teach or reasonably suggest a *symmetrical* ground plane. More specifically, in Figures 1 and 2a of Wicks the one-dimensional ground plane is shown schematically as a horizontal line, which is a typical depiction of an *infinite* ground plane. On the other hand, in Figure 4 of Wicks the ground plane is depicted in three-dimensions as a plate, with the cut-away view again suggesting an *infinite* ground plane. Wicks provides no teaching regarding the shape of the ground planes of Figures 1, 2a and 4, and likewise provides no indication whatsoever that the ground planes are symmetrical. Lastly, in Figure 5 of Wicks the

ground plane is depicted in three-dimensions as a rectangular plate. There are several reasons why this plate is not symmetrical as called for by Claim 1, lines 6-7. First, the schematic rendering of the plate of Figure 5 measures approximately 4" x 2.75", a ratio of 16:11, which is clearly rectangular and not symmetrical. Second, even if we assume, *arguendo*, that the specific dimensions of the figure were not intended to be the actual dimensions (nor the ratio of such dimensions) of an operating embodiment, we are still left with the fact that Wicks is totally silent on the requirement of symmetry. Third, and perhaps most importantly, recall that Wicks addresses the problems of *aircraft* communications antennas. It is well known in the art that in such aviation environments *the ground plane is the body of the aircraft*, which means that the schematic renderings of the ground plane in Figures 1, 2a, 4 and 5 provide no indication of its symmetry. Rather, Wicks as a whole tells one skilled in the art that the ground plane is the aircraft body, and that body is not symmetrical as called for by Claim 1 and as defined by Applicant's specification.

Accordingly, it is respectfully submitted that Claim 1 is not anticipated by Wicks.

Independent Claims 11 and 21 also require a symmetrical ground plane, and for the reasons set forth above would be neither anticipated nor rendered obvious by Wicks.

Regarding dependent Claim 3, the Examiner argues that Wicks teaches in figures 1-5 the antenna structure wherein the taper comprises a *linear constant profile*. This rejection is respectfully traversed. Apparently the Examiner is referring to the straight-line segment D, E, F, G of the mono-blade, which Wicks unambiguously states *is relatively unimportant and is made a straight line for manufacturing ease*. Thus, clearly Wicks does not teach or suggest to one skilled in the art that the straight-line segment has any significant functional role in the operation of the antenna. In addition, a linear-constant profile as called for in Claim 3, and as illustrated in FIG. 3(a), requires both a constant (horizontal) segment and a linear (sloped) segment. Clearly, Wicks is totally devoid of any teaching or reasonable suggestion of such a profile.

Dependent Claim 13 also includes a linear constant profile, and for the reasons set forth above is neither anticipated nor rendered obvious by Wicks.

Regarding dependent Claim 4, the Examiner argues that Wicks teaches in figures 1-5 an antenna structure that supports a *cigar-like directional three-dimensional beam pattern and a butterfly wing-like directional three-dimensional pattern*. This rejection is respectfully traversed. The Examiner's assertion is totally without support. Wicks provides no mention of such beam patterns, and therefore cannot anticipate Claim 4.

Dependent Claim 14 also calls for an antenna structure that supports a cigar-like directional three-dimensional beam pattern and a butterfly wing-like directional three-dimensional pattern, and for the reasons set forth above is neither anticipated nor rendered obvious by Wicks.

Claim Rejections – 35 USC 103

Claims 10, 19 and 21-25 have been rejected under 35 USC 103(a) as being unpatentable over Wicks. The Examiner's position is stated as follows:

> Wicks et al. teaches every feature of the claimed invention except for the symmetrical ground plane is disk shaped.

> It would have been an obvious matter of design choice to have the symmetrical ground plane is (*sic*) disk shaped, since such a modification would have involved a mere change in the shape of the symmetrical ground plane. A change in shape is generally recognized as being within the level of ordinary skill in the art.

This rejection is respectfully traversed for several reasons. First, Wicks does not teach or reasonably suggest the use of a symmetrical ground plane, as explained in Applicant's arguments set forth in the 35 USC 102 section, *supra*, and incorporated herein by reference. Second, it is Applicant's unique contribution to the art of polling antennas that symmetry is important and that disk shaped antenna is particularly useful (e.g., in antennas that use a coax feed, to serve as a trap to eliminate radiation from the coaxial cable, which would otherwise distort the beam).

Claims 2 and 12

Claims 2 and 12 have not been rejected based on Wicks or any other prior art. Applicant respectfully submits that these claims are patentable not only by virtue of their dependence from independent Claims 1 and 11, respectfully, but also because Wicks fails to teach or reasonably suggest that the antenna structure is a *traveling wave antenna supporting a phase velocity greater than the speed of light*. In fact, Wicks teaches away from this feature of the invention: to wit, at column 2, lines 66-67 Wicks specifically teaches that the *slot transmission line has a TEM mode of propagation*. As noted in the traversal of the Section 112 rejection, *supra*, a TEM wave (or mode) is a *slow wave*, which means that its phase velocity is *less than* the speed of light, *not greater than* the speed of light as required by Claims 2 and 12.

Accordingly, it is respectfully submitted that Claims 2 and 12 are neither anticipated nor rendered obvious by Wicks.

Allowable Subject Matter

Applicant hereby acknowledges and gratefully appreciates that the Examiner has indicated that Claim 20 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

In view of the foregoing, reconsideration of claims 1-25, and passage of this application to issue, are hereby respectfully requested. If during the consideration of this paper, the Commissioner believes that resolution of the issues raised will be facilitated by further discussion, he is urged to contact the undersigned attorney at 610-691-7710 (voice) or 610-691-8434 (fax).

Respectfully,

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